

REMARKS

Claims 1-9 are pending. Claim 6 has been canceled herein. Thus, claims 1-5 and 7-9 are now pending. The applicants respectfully request reconsideration and allowance of this application in view of the above amendments and the following remarks.

The applicants note with appreciation the acknowledgement of the claim for priority under section 119 and the notice that all of the certified copies of the priority documents have been received.

The applicants acknowledge and appreciate receiving an initialed copy of the form PTO-1449 which accompanied the Information Disclosure Statement that was filed on Jun 27, 2003.

Claims 3 and 5 were objected to and are accordingly amended herein to address the objection.

Claims 1 and 2 stand rejected under 35 USC 102(e) as being allegedly anticipated by Mayama, et al., U.S. Patent No. 6,778,001 (hereinafter "Mayama"). The applicants respectfully request that this rejection be withdrawn for the following reasons.

The basic features of the present invention, in accordance with, for example a first embodiment as shown in Fig. 1 of the drawings, can be summarized as follows.

(1) A signal corresponding to the "power supply enabling control signal" as recited in claim 1 is a PWM signal, outputted from a control apparatus (ECU 23) to a drive apparatus (22). The drive apparatus includes a drive signal output section which controls driving of the load (e.g., motor 21 in Fig. 1). The power supply enabling control signal is selectively supplied and inhibited from being supplied to the drive apparatus, by the control apparatus (e.g., ECU 23 in Fig. 1). Specifically, with the embodiment of Fig. 1:

(a) when supplied by the control apparatus, the power supply enabling control signal of Fig. 1 is a train of PWM pulses, alternating between an active level (a 5V positive potential, in Fig. 1) and an inactive level (the system ground potential, in Fig. 1), and

(b) when inhibited from being supplied, the power supply enabling control signal is held at the inactive level.

(2) With the embodiment of Fig. 1, a specific parameter of the power supply enabling control signal, i.e., the PWM duty ratio, can be varied by the control apparatus.

(3) When the “power supply enabling control signal” is being supplied to the drive apparatus, the level of power supplied to the load (motor 21 in Fig. 1) by the drive apparatus (22) is varied in accordance with the parameter of the power supply enabling control signal (e.g., PWM duty ratio).

(4) The drive apparatus includes an internal circuit (whose functions are performed in Fig. 1 by the combination of transistors 41, 42, resistors 39, 40, 43, 44, and capacitor 45) which enables supplying of operating power to the drive apparatus only while the power supply enabling control signal is being received by the drive apparatus, and cuts off the supply of operating power when that signal is not being received.

It can thus be understood that in accordance with the present invention, a single control signal such as the power supply enabling control signal, supplied to the control apparatus performs two different functions: 1) to controllably vary the level of electrical power supplied to a load by the drive apparatus, and 2) to selectively enable/inhibit the supplying of operating power to the drive apparatus in accordance with whether the power supply enabling control signal is being supplied.

Claim 1 as amended herein now sufficiently sets out the above features with greater clarity. In addition, claim 2 is amended to specify that the power supply enabling control signal is a PWM signal and that the control parameter which determines the level of power supplied to the load is the duty ratio of that PWM signal. Claim 4 is correspondingly amended to omit the now unnecessary portion specifying the power supply enabling control signal as a PWM signal. Claims 5, 7, 8 and 9 have been similarly amended, and claim 5 has been further amended for greater clarity.

With regard to the circuit described in Mayama, for example in Fig. 1, when a switch SW is closed, a drive control circuit 16 provides a path for an operating current of a control signal supply circuit 14 to flow through the drive control circuit 16 to ground potential. The control signal supply circuit 14 is thereby activated, switching on a power FET 1 which in turn supplies power to a load L. When the switch SW is open, no operating current can flow in the control signal supply circuit 14, and no power is supplied to the load L.

Accordingly, the control signal of Mayama that is supplied from the switch SW cannot be used to controllably vary the level of power supplied to the load, but simply performs ON/OFF switching of the circuit which ultimately delivers power to the load. The only purpose of the drive control circuit 16 is to ensure that any flow of leakage current in the switch SW, which might result from, for example, moisture condensation on the switch, when the switch SW is in the open state cannot result in accidental enabling of a supply of operating current to the control signal supply circuit 14. Other embodiments of Mayama are similar, but having for example, the operating current of the control signal supply circuit flowing through a drive control circuit to the positive supply potential, or through two drive control circuits to the positive supply potential and to ground potential.

Since the control signal supplied from the switch SW in Mayama has only a single ON/OFF control function, it can clearly be distinguished from the power supply enabling control signal of the claimed invention. Accordingly, for at least the reasons set forth above, since Mayama fails to disclose the features as claimed, the rejection of claims 1 and 2 should be reconsidered and withdrawn.

Claims 3 and 4 stand rejected under 35 USC 103(a) as being allegedly unpatentable over Mayama in view of Freymuth, U.S. Patent No. 4,636,711. The applicants respectfully request that this rejection be withdrawn for the following reasons.

Applicants note that claims 3 and 4, by virtue of depending from claim 1 are allowable for at least the reasons set forth herein above. In addition claims 3 and 4 are independently allowable and drawn to a case in which the power supply enabling control signal has dual functions as described above. Freymuth describes as PWM circuit with a variable PWM duty cycle, whereby the duty ratio can be controllably varied over a range from 0 to 100%, and with the use of such a PWM signal in controlling the power of a load such as an electric motor.

In making the rejection, the Examiner asserts that Mayama's control circuit could be modified to incorporate PWM control. First, no evidence has been provided of a suggestion or motivation to combine the reference to arrive at the claimed invention. A close review of the switches SW of Mayama as noted above reveals that these are mechanical switches designed for non momentary switching action and thus would be wholly unsuitable for replacement by a PWM circuit. There is simply no basis for a combination which arrives at the claimed invention and such an attempted combination would improperly rely on hindsight reconstruction of the references.

Claims 5 and 6 stand rejected under 35 USC 103(a) as being allegedly unpatentable over Mayama in view of Freymuth, U.S. Patent No. 4,636,711 and further in view of applicants' allegedly admitted prior art (Figure 5). The applicants respectfully request that this rejection be withdrawn for the following reasons.

Claim 6 has been cancelled and will not be discussed. Claim 5 is amended herein to recite that a power supply enabling control signal is a PWM signal, having, for example, control functions as described above. The allegedly admitted prior art of the present application relates to an apparatus in which a main circuit 3 is activated to supply power to a load only when enabled by a waiting status control circuit. The enabling/inhibiting condition of the waiting status control circuit is controlled by an externally supplied control signal, e.g. from the ECU 1 in Fig. 5. However in accordance with the circuit shown in Figure 5, operating power continues to be supplied to circuits including the waiting status control circuit while the control signal is not being supplied, constituting a basic disadvantage as described in the corresponding portion of the present application (see, e.g. page 2, line 19). Thus for at least the reasons set forth above, Mayama and the applied art combination fails to teach or suggest, for example, the claimed control signal apparatus having means for driving said low-side switching element in accordance with a pulse width modulation (PWM) signal and the claimed drive signal output section.

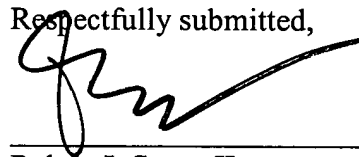
It is respectfully requested that the rejection of claim 5 be reconsidered and withdrawn.

The indication of allowability with regard to claims 7-9 is noted with appreciation. Applicants respectfully reserve the opportunity to rewrite claims 7-9 pending the outcome of further prosecution on the merits and consideration of the present amendment and response.

In view of the foregoing, the applicants respectfully submit that this application is in condition for allowance. A timely notice to that effect is respectfully requested. If questions relating to patentability remain, the examiner is invited to contact the undersigned by telephone.

Please charge any unforeseen fees that may be due to Deposit Account No. 50-1147.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'R. L. Scott, II', written over a horizontal line.

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